# VACUUM CLEANER BAG DOCKING ASSEMBLY

## TECHNICAL FIELD

The invention is directed to a bag docking assembly and, more particularly, to an assembly for docking a vacuum bag in the proper orientation for engagement with a dirty air outlet nozzle on a vacuum cleaner, and for retaining the vacuum bag in the position of engagement.

## BACKGROUND OF THE INVENTION

Vacuum cleaners, such as upright vacuums, remove dirt from a carpet by creating a suction strong enough to draw the dirt particles from a section of the carpet up into the vacuum cleaner where the dirty air is passed through a vacuum bag in which the entrained dirt is captured. To increase the efficiency of this process, a base portion of the vacuum cleaner often has a roller brush for agitating dirt from the carpet as it is being vacuumed.

Inside the vacuum cleaner, a dirty air conduit transfers the dirty air from the base of the vacuum cleaner to the vacuum bag. The dirty air conduit runs up a handle assembly or, in cases where the dirty air conduit is rigid, the dirty air conduit can itself function as a portion of the handle. At the end of the dirty air conduit opposite the floor there is a dirty air outlet nozzle where the dirty air exits from the dirty air conduit. The vacuum bag is attached to the dirty air outlet nozzle.

The vacuum bag has a bag opening that fits closely over the dirty air outlet nozzle. The vacuum bag is otherwise a completely closed bag that is made from a porous material that allows air to flow through it, but which is too fine for most dirt particles to pass through. As dirty air passes through the vacuum bag, the air is forced through the porous material and the dirt is trapped in the bag. The bag thus collects the dirt from the dirty air and, more importantly, from the floor. Because the material of the vacuum bag is often fragile and can get very dusty, the vacuum bag is commonly held within a protective outer bag.

The outer bag is typically placed over the dirty air outlet nozzle first, with the dirty air outlet nozzle extending through a hole in the outer bag. A clip is then forced over the dirty air outlet nozzle between the outer bag and a protrusion on the outer surface of the dirty air outlet nozzle. The clip retains the outer bag in the proper position for use. Finally, the vacuum bag is placed over the remaining length of the dirty air outlet nozzle, and the outer bag closed.

To eliminate the need for emptying or cleaning the vacuum bag after it has collected dirt, vacuum bags have been modified over the years to be disposable. This allows the user to merely discard the dirty vacuum bag and replace it with a new, clean one. To adapt the vacuum bags for easy replacement, the bags have been designed so that the bag opening can be releasably engaged with the dirty air outlet nozzle.

One common vacuum bag design incorporates a reinforced area, known as a collar, surrounding the bag opening. The collar is usually a square or rectangular piece of thin cardboard. To install the vacuum bag, the user holds the collar by one or more edges, and forces the bag opening over the dirty air outlet nozzle. The collar can be designed with an elastic seal extending inward from the circumference of the bag opening to further seal the gap between the dirty air outlet nozzle and the bag opening.

Two primary problems exist with disposable vacuum bags. First, because the disposable vacuum bag is designed to be held within the outer bag, the dirty air outlet nozzle is often positioned deep within the outer bag and is hidden from sight. The user can initially look into the outer bag and see the dirty air outlet nozzle; however, when the vacuum bag is partially positioned for engagement with the dirty air outlet nozzle, the vacuum bag interferes with whatever unobscured view the user had of the dirty air outlet nozzle. As a result, the vacuum bag must be installed entirely be feel. Installing a vacuum bag by feel increases the possibility that the bag opening will not be properly aligned with the dirty air outlet nozzle when the installer pushes the collar onto the vacuum cleaner. If the collar is not aligned properly, forcing the collar onto the dirty air outlet nozzle can bend or break the collar. A vacuum bag with a bent or broken collar is more likely to leak or disengage during operation.

Another problem associated with disposable vacuum bags is that the vacuum bag is not held firmly to the dirty air outlet nozzle. The collar is often held onto the dirty air outlet nozzle by a small protrusion or a thin tab of cardboard. When the vacuum cleaner is turned on, the air rushing into the vacuum bag tends to urge the collar in a direction of disengagement from the dirty air outlet nozzle. As the vacuum bag fills, the pressure increases and, consequently, so does the force on the collar. If the collar is damaged during installation, or if the cardboard tab is not strong enough, the bag can disengage during operation, allowing dirty air to fill the outer bag. This results in the outer bag, which is not disposable, becoming soiled with dust and dirt.

Numerous different collar arrangements have been designed to retain the collar over the dirty air outlet nozzle. See, for example, U.S. Pat. No. 5,092,915 to Lackner; U.S. Pat. No. 5,064,455 to Lackner; U.S. Pat. No. 5,464,460 to Bosses; and U.S. Pat. No. 4,678,486 to Jacob et al. These designs generally incorporate protrusions on the dirty air outlet nozzle that engage with the collar. The interference between the protrusions and the collar retains the collar on the dirty air outlet nozzle. As with the traditional designs, if the collar is damaged, the vacuum bag can still leak or disengage from the dirty air outlet nozzle.

One invention, U.S. Pat. No. 5,688,298 to Bosses, attempts to solve the problem of aligning the vacuum bag with the dirty air outlet nozzle by adding an additional layer on the surface of the collar. The additional layer has a large, circular opening. The user can lightly press the face of the collar against the dirty air outlet nozzle and move the collar around until the dirty air outlet nozzle falls into the gap created by the additional layer. This lets the user know that the collar is in the proper position to be pressed against the dirty air outlet nozzle. This design does not incorporate any additional features to help retain the collar on the dirty air outlet nozzle.

One attempted solution to the problems of both alignment and retention is discussed in U.S. Pat. No. 5,089,038 to Kopko et al. This invention is designed for use with a vacuum cleaner having a rigid housing surrounding both the vacuum bag and the dirty air outlet nozzle. A hinge is integrally formed to the inside of the housing. A mounting plate holding the vacuum bag by its collar is attached to the hinge, and pivots to engage and disengage the vacuum bag from the dirty air outlet nozzle. The hinge is designed with positive stops to prevent the mounting plate from rotating too far. When the mounting plate is rotated to the point of engagement, the collar on the vacuum bag seals with the dirty air outlet nozzle. When the mounting plate is rotated to the point of disengagement, a user accessing the unit from the back of the housing may remove the vacuum bag from the mounting plate and replace it with a new one.

One problem associated with the Kopko et al. invention is that it is limited to use on vacuum cleaners having rigid housings. Without a rigid housing, the invention does not provide or suggest any place to attach the hinge. Another problem is that the hinge is designed with positive stops at the rotational limits. The mounting plate is thus only free to rotate over a limited angle. This limits the number of orientations in which the invention may be applied.

A need therefore exists for an improved bag docking assembly for aligning a vacuum bag with a dirty air outlet nozzle, and for retaining the vacuum bag in the position of engagement.

## SUMMARY OF THE INVENTION

It is therefore an object of this invention to provide an improved bag docking assembly for aligning a vacuum bag for engagement with a dirty air outlet nozzle on a vacuum cleaner, and for retaining the vacuum bag in the position of engagement. The invention also serves to retain an outer bag to the vacuum cleaner. The invention is directed to a vacuum cleaner bag docking assembly for use with vacuum cleaner bags of the type having a substantially rigid mounting collar surrounding the bag opening. The assembly incorporates an anchor member and a mounting member.

The anchor member serves to attach the bag docking assembly to the vacuum cleaner. The anchor member can be a substantially flat piece of plastic having a central opening for closely receiving the dirty air outlet nozzle on the vacuum cleaner. The central opening can have a shoulder for engaging a rim or similar protrusion formed about the perimeter of the dirty air outlet nozzle. One edge of the anchor member can have a first hinge member.

The mounting member can also be fabricated from a piece of flat plastic. The mounting member can have side walls, an end wall, and channels about a portion of its perimeter for engagement with the edges of the collar. The mounting member has a central opening corresponding to the location of the opening in the vacuum bag when the collar is engaged with the mounting member. One edge of the mounting member can have a second hinge member complementary to the first hinge member on the anchor member.

During operation, the anchor member can be slid over the dirty air outlet nozzle with the central opening in the anchor member closely fitting around the perimeter of the dirty air outlet nozzle. The edge having the hinge member is preferably oriented at the bottom. The resilient material of the anchor member is forced beyond a rim or similar protrusion on the dirty air outlet nozzle, and the rim holds the anchor member in place against the handle assembly of the vacuum cleaner.

The mounting member is pivotally connected to the anchor member by engagement of the first and second hinge members. The mounting member is free to rotate over an angle of approximately 180 degrees, from the point where the mounting member abuts the anchor member (the working position) to the point where the mounting member abuts the vacuum cleaner handle. At some point between the two angles, the mounting member is in a position that is convenient for the insertion and removal of the bag collar from the mounting member (the loading position).

When the mounting member is in the loading position, the bag collar can be inserted or removed from the mounting member while in plain view of the user. The edges of the bag collar slidably engage the channels in the mounting member and the channels retain the collar in the proper location and orientation to engage the dirty air outlet nozzle. When the mounting member is rotated into the working position, the bag opening engages the dirty air outlet nozzle. Because the mounting member holds the collar in the proper orientation for engagement, the user does not need to align the bag with the dirty air outlet nozzle. The user can merely pivot the mounting member against the anchor member and thereby engage the bag with the dirty air outlet nozzle.

In another embodiment, the opening in the mounting member is adapted to closely receive the anchor member when the assembly is in the working position. A latch can retain the mounting member against the anchor member, thereby retaining the vacuum bag in the position of engagement with the dirty air outlet nozzle. The latch can be a resilient protrusion extending from the perimeter of the anchor member. When the mounting member is pivoted to engage the anchor member, the protrusion is forced through the opening and retains the assembly in the working position.

In yet another embodiment, the anchor member can have an entrance channel along one of its edges and a reduced neck portion between the entrance channel and the central opening. In this embodiment, the anchor member engages the dirty air outlet nozzle from a transverse direction, with the resilient neck portion distorting around the dirty air outlet nozzle. Once the dirty air outlet nozzle is engaged with the central opening, the neck returns to its original shape and retains the anchor member in place.

In still another embodiment, the side walls and end wall of the mounting member intersect at opposing corners. At least one of the corners is chamfered to have a portion thereof set off at an angle to both the side wall and end wall. The collar is fabricated with a complementary profile so that the user is assured that the collar is engaged with the mounting member in the proper orientation.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an isometric view of a vacuum cleaner incorporating a bag docking assembly according to one embodiment of the present invention.

FIG. **2** is an exploded isometric view of a vacuum cleaner bag and a vacuum cleaner incorporating a bag docking assembly according to one embodiment of the present invention.

FIG. **3** is an exploded isometric view of a bag docking assembly according to one embodiment of the present invention.

FIG. **4** is an isometric view of a bag docking assembly according to one embodiment of the present invention.

FIG. **5** is a partial section view as viewed along Section **5**—**5** of FIG. **3** of the anchor member of a bag docking assembly according to one embodiment of the present invention.

FIG. **6** is a partial section view as viewed along Section **6**—**6** of FIG. **3** of the mounting member of a bag docking assembly according to one embodiment of the present invention.

FIG. **7** is a partial section view as viewed along Section **7**—**7** of FIG. **3** of the mounting member of a bag docking assembly according to one embodiment of the present invention.

FIG. **8** is an isometric view of a vacuum bag collar according to another embodiment of the present invention.

FIG. **9** is an isometric view of a vacuum bag collar according to yet another embodiment of the present invention.

## DETAILED DESCRIPTION OF THE INVENTION

The present invention is directed toward a vacuum cleaner bag docking assembly for docking a vacuum cleaner bag in the proper orientation for engagement with a dirty air outlet nozzle on a vacuum cleaner, and for retaining the vacuum bag in the position of engagement. Many specific details of certain embodiments of the invention are set forth in the following description and in FIGS. **1–6** to provide a thorough understanding of such embodiments. One skilled in the art, however, will understand that the present invention may have additional embodiments, or that the invention may be practiced without several of the details described in the following description.

FIG. **1** shows a bag docking assembly **10** according to one embodiment of the present invention in a position of engagement with an upright vacuum cleaner **12**. The vacuum cleaner **12** has a base **14** and a handle assembly **16**. In this embodiment, a portion of the handle assembly **16** is a hollow tube serving as a dirty air conduit **18**. The dirty air conduit **18** connects the base **14** with a dirty air outlet nozzle **20**. The dirty air conduit **18** can also be independent of the handle assembly **16**. The bag docking assembly **10** is preferably removably attached to the dirty air outlet nozzle **20**. A protective, outer bag **22** can be positioned around both the dirty air outlet nozzle **20** and the bag docking assembly **10**.

FIG. **2** shows an exploded view of a vacuum bag **24** positioned to engage the bag docking assembly **10**, and the bag docking assembly **10** positioned to engage the dirty air outlet nozzle **20** on the vacuum cleaner **12**. The vacuum bag **24** has a bag opening **26** through which dirty air enters the vacuum bag **24** for collection of entrained dirt. The bag opening **26** is surrounded by a reinforced collar **28**. The bag opening **26** can also be surrounded by an elastic seal **30** to create a more air-tight seal when the vacuum bag **24** is engaged with the dirty air outlet nozzle **20**. The vacuum bag **24** may also be designed to have a sliding panel **32** that slides between an opened position and a closed position over the bag opening **26** to prevent spillage when the vacuum bag **24** is disengaged from the vacuum cleaner **12**. A retainer opening **34** is located on the sliding panel **32** to provide a grip for retaining the collar **28** and for moving the sliding panel **32**.

The bag docking assembly **10** incorporates an anchor member **36** and a mounting member **38**. The structure and operation of both the anchor member **36** and the mounting member **38** are discussed in detail below. Generally, the anchor member **36** retains the bag docking assembly **10** to the vacuum cleaner **12**. The mounting member **38** is pivotally attached to the anchor member **36**. The mounting member **38** pivots between a loading position, in which the collar **28** of the vacuum bag may be engaged or disengaged with the mounting member **38**, and a working position, in which the bag opening **26** engages the dirty air outlet nozzle **20**.

FIGS. 3 and 4 best illustrate one embodiment of the bag docking assembly **10**. The anchor member **36** preferably takes the form of a substantially flat member composed of resilient material, preferably plastic, that is molded to have a central opening **40** for engaging the dirty air outlet nozzle **20**. The central opening **40** in the anchor member **36** is larger than the dirty air outlet nozzle **20** to allow the dirty air outlet nozzle **20** to pass through the central opening **40** in the anchor member **36**. In one embodiment, a portion of the central opening **40** is adapted to have a shoulder **42**. The shoulder **42** forms a recess which closely and captively receives a complementary elevated portion on the dirty air outlet nozzle **20**, such as a rim **43**, a protrusion, or a flange.

In the preferred embodiment, the anchor member **36** is constructed to have an entrance channel **44** at one point about the perimeter of the anchor member **36** to allow the anchor member **36** to be inserted over the dirty air outlet nozzle **20** from a transverse direction. The entrance channel **44** is contiguous with the central opening **40** in the anchor member **36**, and is separated from the central opening **40** by a reduced neck **46**. The neck **46** is resilient enough to deform as it passes over the dirty air outlet nozzle **20** and return to its original shape once fully engaged. The neck **46** thus holds the anchor member **36** to the dirty air outlet nozzle **20**.

To install the preferred embodiment, the anchor member **36** is first positioned adjacent the dirty air outlet nozzle **20** with the general plane of the anchor member **36** on the side of rim **43** closest to the handle assembly **16**. The anchor member is slid in a direction transverse to the dirty air outlet nozzle **20** until the dirty air outlet nozzle **20** is completely engaged with the central opening **40**. The anchor member **20** is then urged against the rim **43** until the recess in the shoulder **42** closely contacts the rim **43**. The outer bag **22** can be interposed between the anchor member **20** and the handle assembly **16** to urge the anchor member **20** against the rim **43**, or other biasing means can be substituted (FIG. **1**).

In the preferred embodiment, the mounting member **38** is formed of a plastic that has been injection molded into a substantially planar body. The mounting member **38** is formed with an opening **52** that is positioned to correspond with the bag opening **26** when the collar **28** of the vacuum bag **24** is retained within the mounting member **38** in the proper position for engagement with the dirty air outlet nozzle **20** on the vacuum cleaner **12** (FIG. **2**), as discussed in more detail below. In the preferred embodiment, the opening **52** in the mounting member **38** is large enough to engage the perimeter of the anchor member **36**.

The mounting member **38** can be pivotally attached to the anchor member **36** by a hinge structure, such as a first hinge member **48** on the anchor member **36** and a second hinge member **58** on the mounting member **38**. The mounting member **38** can rotate over an angle of up to 180 degrees between the point where it contacts the anchor member **36** and the point where it contacts the handle assembly **16**. A latch mechanism, such as a protrusion **50** (FIG. **5**) and a material receiving notch **56** (FIG. **7**) can be utilized to retain the mounting member **38** against the anchor member **36**, i.e., retain the mounting member **38** in a working position, as illustrated in FIG. **4**.

Portions of the perimeter of the mounting member **38** can have one or more channels **54** for slidably receiving the edges of the collar **28** on the vacuum bag **24**. The thickness of the channel **54** is slightly larger than the thickness of the collar **28** to allow the user to easily slide the collar **28** onto and off of the mounting member **38**.

The perimeter of the mounting member **38** may also have a retainer member **60** (FIG. **6**) that extends from the perimeter of the mounting member **38** toward the center of the opening **52**. The retainer member **60** is positioned to engage the retainer opening **34** in the collar **28** of the vacuum bag **24**.

In another embodiment, the mounting member **38** is shaped to receive a collar **28** having a chamfered corner **64**. The collar **28** in this particular arrangement has two opposing side margins and an end margin connecting the two side margins (FIG. **8**). One or both of the corners between the